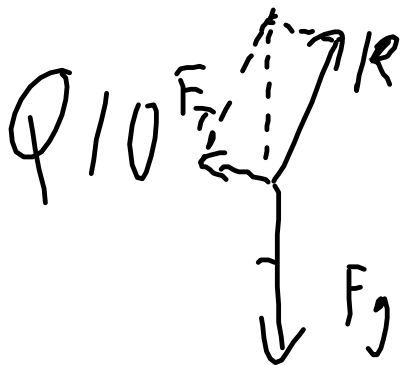
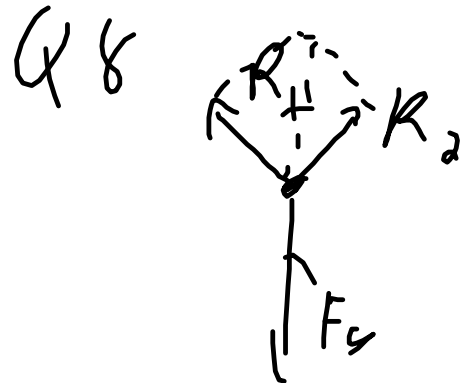
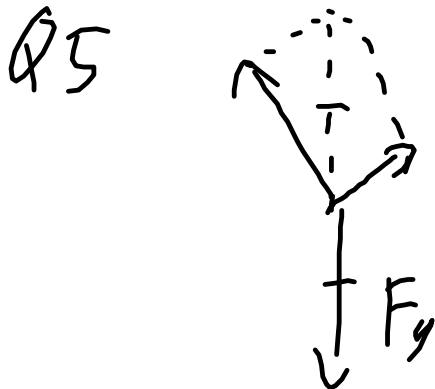
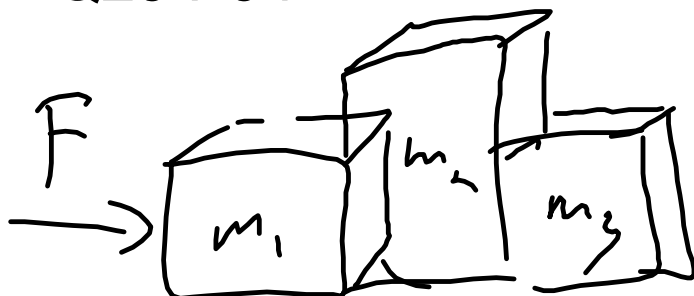


Free body diagrams worksheet slopes and pulleys



Homework?

Q29 P94



$$F_{\text{net}} = ma = \sum F$$

whole $F_{\text{net}} = F = ma$

a) $a = \frac{F}{m_1 + m_2 + m_3}$

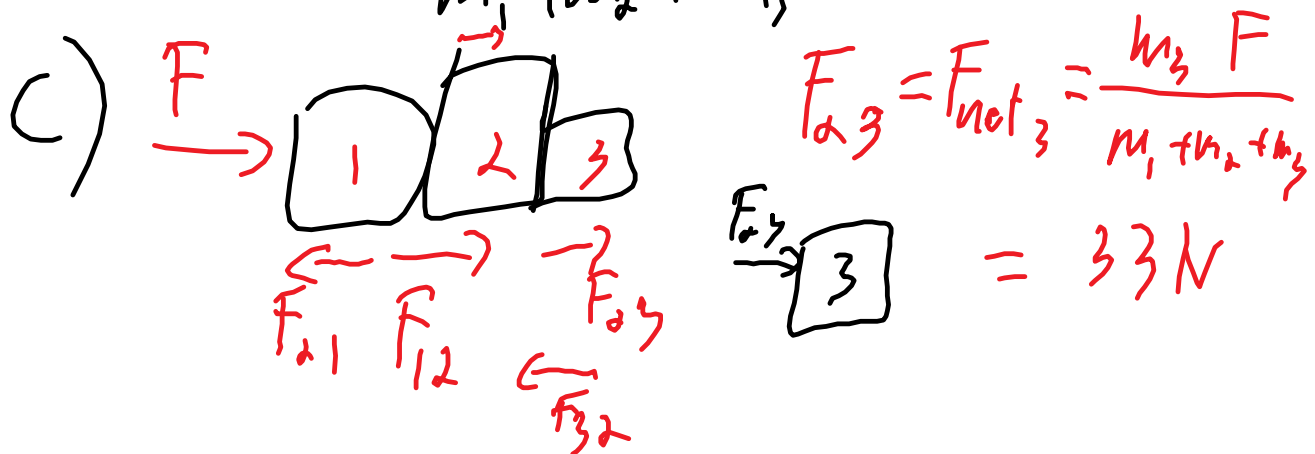
d) $a = \frac{100}{10+10+10} = 3.33 \frac{\text{m}}{\text{s}^2}$

b) $F_{\text{net}} = ?$ ma

$$F_{\text{net}1} = m_1 a = \frac{m_1 F}{m_1 + m_2 + m_3} = 33 \text{ N}$$

$$F_{\text{net}2} = \frac{m_2 F}{m_1 + m_2 + m_3} = 33 \text{ N}$$

$$F_{\text{net}3} = \frac{m_3 F}{m_1 + m_2 + m_3} = 33 \text{ N}$$



Free body diagram for block 2:

$$F_{12} \rightarrow \text{Block 2} \leftarrow F_{32} = -\frac{m_3 F}{m_1 + m_2 + m_3} = -33 \text{ N}$$

$$F_{\text{net}2} = \frac{m_2 F}{m_1 + m_2 + m_3} = 33 \text{ N}$$

$$F_{\text{net}2} = F_{12} - |F_{32}|$$

$$\frac{m_2 F}{m_1 + m_2 + m_3} = F_{12} - \frac{m_3 F}{m_1 + m_2 + m_3}$$

$$\frac{m_2 F}{m_1 + m_2 + m_3} = F_{12} - \frac{m_3 |}{m_1 + m_2 + m_3}$$

$$F_{12} = \frac{(m_2 + m_3) F}{m_1 + m_2 + m_3} = 66N$$

Slopes:

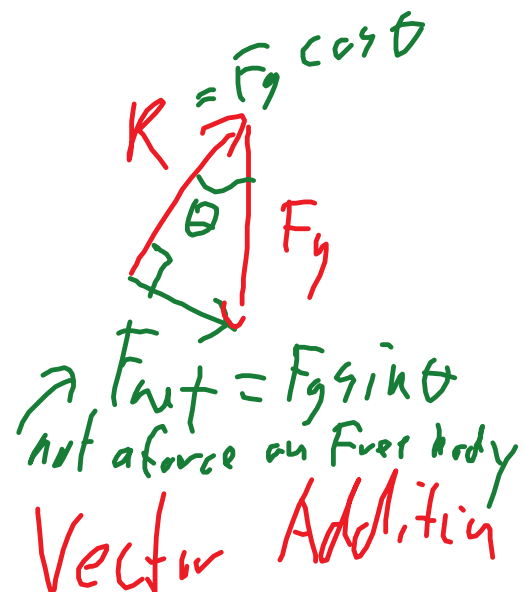
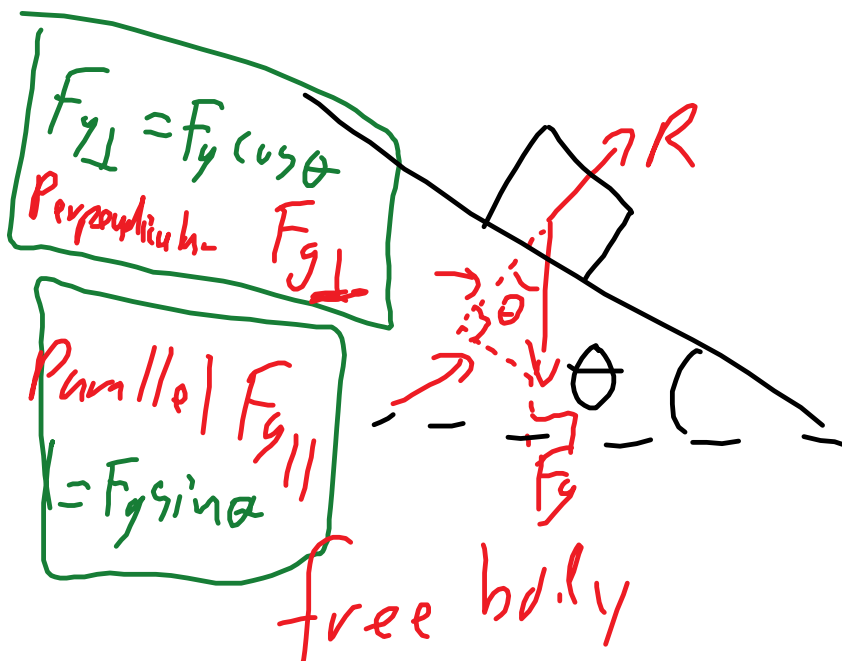
Big idea: components of force parallel to the slope and perpendicular to the slope rather than x and y.

Look at a block sliding on a frictionless slope.
free body diagram

vector addition diagram

get equations for the force of gravity parallel and perpendicular to the slope

SOHCAHTOA



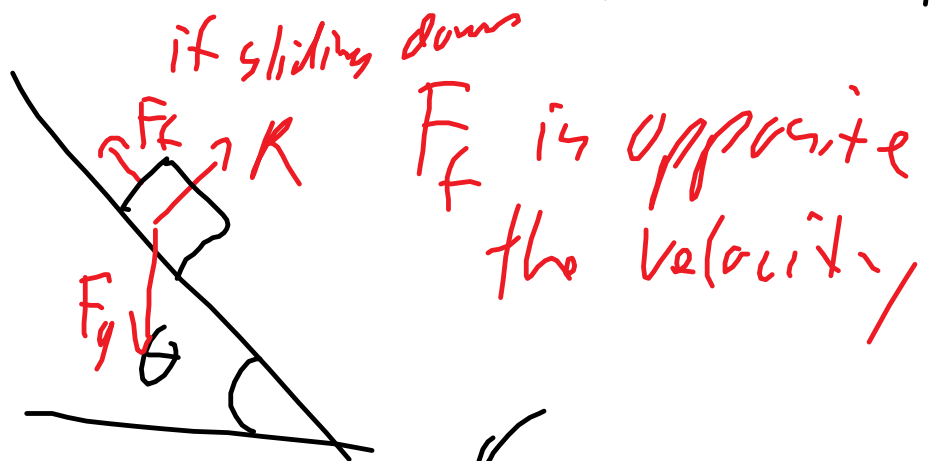
free body

$$F_{\text{net}} = ma = \Sigma F$$

$$ma = mg \sin \theta$$

$$a = g \sin \theta$$
 frictionless slope

What if there is friction?



$$F_{\text{net}} = F_{g\parallel} (-) F_f \quad \text{going down}$$

$$ma = mg \sin \theta - \mu mg \cos \theta$$

$$a = g \sin \theta - \mu g \cos \theta$$

A 2.00 kg block is on a 35.0° slope.

Determine the acceleration of the block if:

- a) the surface is frictionless
- b) the coefficient of friction is 0.30
- c) determine the coefficient of friction that will prevent the block from sliding.
- d) the block is attached by a string over a pulley up the slope to a 4.00kg block hanging off the table. Recalculate a) b) c).

